THE BRITISH VETERINARY JOURNAL

EDITORS:
SIR THOMAS DALLING, *M.A., D.Sc., F.R.C.V.S., F.R.S.E.*
J. McCUNN, *M.R.C.V.S., M.R.C.S., L.R.C.P.*

Vol. 108 **January, 1952** **No. 1**

EDITORIAL

VETERINARY EDUCATION

IT has been announced recently that there has been established a Veterinary Faculty at the University of Liverpool. This action marks an important advance in veterinary education in this country, raising the status of veterinary science from a Board of Studies in Veterinary Science to that of a Faculty in that university. The University of Liverpool, which has for many years been keenly interested in veterinary education, has now shown its faith in, and appreciation of, the veterinary profession by being the first university in this country to establish such a faculty: it will be recorded in subsequent historical writings of our profession that the University of Liverpool, by this action, gave the lead to other universities—a lead which we hope will soon be followed. All those, veterinarians and others, who have been concerned with this movement deserve our thanks and congratulations. We will await with eagerness and interest further evidence of a like nature that the work of the veterinary profession is fully appreciated throughout the country.

It has also been interesting and instructive to read that universities now concerned with veterinary education are establishing Chairs and Readerships in subjects of vital importance to veterinary science. There is no doubt that veterinary education is being taken seriously, and that our hopes and beliefs that it would be put on a sound footing, following the passing of the Veterinary Surgeons Act (1948), were justified. Not only is due recognition being given to veterinary affairs by universities intimately concerned with veterinary education: there is evidence that other universities are anxious to associate themselves with our profession. The establishment of a Chair of Comparative Pathology by Queen's University, Belfast, and the appointment of a member of our pro-

(The December issue of The British Veterinary Journal was published on December 30)

XUM

fession as the first Professor, is further evidence of our standing in the eyes of the educational world. We congratulate Queen's University, not only on establishing the Chair, but also on its choice of the holder.

We have pleaded in many of our editorials for greater collaboration between universities and our profession. We have pointed out the advantages of close association, not only in educational matters, but also in research work, and in all aspects of life that go to make for a better understanding of the needs for a strong and active veterinary profession. It is indeed gratifying to see how the desires of many of our colleagues are being fulfilled. With the opportunities now being given to us, and the interest now being shown in our work, we, in our turn, must continue even more actively to prove to the country and to the world that the faith in us is not misplaced. We, as a profession, have done much good work in the past: we are now engaged in work of great national and international importance, which is well recognised: we have still wide fields open to us, in which we can, and must, exert all our power and influence for the good and well-being, not only of livestock, but, indirectly, on human populations. For future developments we must look to the rising generation and generations to come. Opportunities are now available to receive a wider type of education, to participate in research work with a wider scope than in the past, and to acquaint those interested in many aspects of science with our problems with a view to obtaining their further help and collaboration. Time alone will show the value of these developments. We have, however, no doubt in our minds that the outcome will show their value and that the veterinary profession will continue to expand in all lands and will prove even further its importance in the affairs of the world.

FOOT-AND-MOUTH DISEASE

In the last issue of the British Veterinary Journal (December, 1951) we referred to the present extensive outbreaks of foot-and-mouth disease in Europe, and pleaded for "international collaboration in the study of the disease and its cause from all possible angles—in the laboratory and in the field," and for "action now . . ."

We have received a letter from Dr. Gaston Ramon, Director, Office International des Epizooties, Paris, in which he says that since its foundation, and especially during the recent times, the Office International des Epizooties has never ceased to be greatly concerned with this same subject. With his letter, Dr. Ramon enclosed a number of reprints of publications and a copy of the proceedings of a European conference on foot-and-mouth disease, held under the auspices of the Office in Berne in November, 1951, at which delegates of 15 nations were present, as well as observers from the United States of America, F.A.O., and O.E.E.C. A perusal of these papers shows clearly the opinion of the Office that the problem of the control of foot-and-mouth disease in Europe is an international one.

XUM

SPECIAL ARTICLE

HISTORY OF THE VETERINARY PROFESSION 1851-1951*

(a) The Year 1881 as a Great Landmark in the Modern History of the British Veterinary Profession; The Chief Leaders in Successful Reform, with Particular Reference to John Henry Steel *(Concluded)*

By J. T. EDWARDS, D.Sc., M.R.C.V.S.

VI

Some account of the life and work of Banham has already been published by the writer (*Vet. Rec.*, 1941, *53*, 97). The life and work of John Henry Steel are not so well known to the present generation, but the published records concerning him are far more ample and enable his posterity to form an even much better idea of the man as he was himself. Like so many other young men who have been leaders in veterinary reform movements, he appears to have been largely inspired by a father, Charles Steel (1829-1913), who himself was a zealous and much respected veterinarian. The father had qualified from the London College in 1851, and then entered the Army as Veterinary Surgeon, 12th Lancers. He was elected a foundation Fellow of the R.C.V.S. in 1877. He took an active part in founding the Veterinary Medical Association of Ireland, and was its President for several years. For some years after retiring from the Army, he lectured on veterinary science at the Yorkshire Agricultural School and after taking an active part with his son in promoting the 1881 Congress, he took a great interest during the rest of his long life in its continuance as the National Veterinary Association, being last present, in full vigour, at the Carnarvon meeting. He was a good speaker who was always well informed, and he was gifted with a pleasing humour. The eldest son, John Henry, entered, after a brilliant school career, the London Veterinary College as a student in 1872. (The writer well recalls speaking about him to a younger son, who was then a senior officer in the Royal Army Medical Corps, while on active service during an early phase of the 1914-18 war. And although that son modestly confessed that his deceased elder brother was gifted on a plane far above the rest of the family, there was in his general bearing so much that tallied with the descriptions left of the elder brother that it is not difficult to reconstruct a vivid image of what that brother must have been like in life.)

* It is much regretted that owing to pressure on our space this portion of the concluding instalment of "The History of the Veterinary Profession, 1851-1951," had to be held back and did not appear in the preceding (December, 1951) issue of this JOURNAL.

At College, John Henry Steel soon evinced such passion for work that, combined with natural abilities of a very high order as well as those moral qualities of humility and helpfulness which aroused the affection and admiration of his contemporaries, it was plain to all he was destined for a career of most exceptional promise. In his posthumous papers, now in the possession of the R.C.V.S., the late General Sir Frederick Smith has recorded how soon after he had entered the London College as a student, two years after Steel, he was fortunate in coming under his guidance. Then, at that early stage, Steel set out a Spartan programme of daily work and self-discipline for Smith based on his own practice, from which he (Smith) never departed, although its execution meant to him sixteen hours of active, concentrated work daily, a frugal dietary, and rigid self-denial.

After qualification, in 1875, Steel entered the Army at once, but only remained in it for a brief period of nine months, a vacancy then occurring at the College as Demonstrator of Anatomy, which he was invited to fill. As a teacher he was an outstanding success; for although he was not a good lecturer (a certain hesitancy in speech, which the writer also noted in the brother, detracting from his capacity of ready appeal to his listeners), yet " his enthusiasm in his work, modesty, and kindness of manner, the pains he took in imparting instruction, his sterling integrity, and his hatred of meanness, rendered him the most lovable of men, as he was also the most sincere of friends."

His first publication—*Outlines of Equine Anatomy* (1876)—filled at the time " a huge void " in the British veterinary literature. There had, indeed, been available for some decades a very rudimentary work by William Percivall; otherwise, from the beginning the students had had to depend on dictated notes. However, within a few years McFadyean's admirably precise works, with the more compendious foreign publications, came to supplant Steel's timely little work.

Besides what appertained to his own department, Steel's activities elsewhere in revitalising the College were prodigious. Thus, with energy and resolution he set to work to rearrange and catalogue the museum, and added to it much new material, anatomical and pathological—all of which work, unfortunately, after his day, was again allowed to lapse. The *Veterinarian,* " whose sluggish existence was a standing reproach to the institution which carried it on," received a new lease of life, Steel's principal contributions being excerpts from the foreign veterinary periodicals. The students' Veterinary Medical Society received also a large share of his attention. Meanwhile, he was collecting his materials for his work on *Diseases of the Ox*, which was later first published in 1881.

Throughout his life he entertained the belief that it was only by entering within the University system that veterinary education could be well developed, and so, to prepare himself to achieve that end, he undertook the Degree Course in Science of the London University; it was his intention later to proceed to the Doctorate in Science. In addition to all these teaching and academic

activities he did not neglect his health, for he was an excellent football player and a good companion.

It was one of the succession of tragedies which had marred the ill-fated school at Camden Town almost from the very outset of its establishment in 1791 that, out of a feeling of injured self-respect, Steel felt compelled to resign in 1881, and he then joined the Army.* There had been an evident breach of faith on the part of the Governors in the matter of his promotion which left him in a state of pecuniary embarrassment, as well as gross and culpable ignorance on the part of that body as to the extent of the duties he was fulfilling within the institution. However, he does not seem to have harboured any rancour towards the Governors on that account, as he did not believe they were really responsible (see *The Veterinarian*, 1881, *57*, 357; Smith's [1927] *Hist. R.A.V.C.*, p. 191; and *Vet. Rec.*, 1891, *4*, 380).

(Parenthetically, just at the time of Steel's resignation, a high-minded Scottish practitioner, Robertson of Kelso, was appointed head of the College and he was doomed after a few years to die broken-hearted at his post.)

It was at the time of his resignation from the London school that (as is evident from the speech he made in reply to a handsome presentation made to him by the students) Steel conceived the idea of a British Veterinary Congress.* The work entailed cost him several months of hard work. It is plain from the report of proceedings (which is one of the rare historic documents of the profession) that he was gifted with exceptional powers of organisation, qualities which do not often accompany profound scientific and intellectual gifts. It is plain, too, from a perusal of the reports of the succeeding annual meetings of the National Veterinary Association, to which the above Congress was the forerunner, that the lion's share in organising that Congress must have fallen on Steel. For after a few years, when the Association was entrusted into the hands of Steel's associate, Banham, as Secretary, and during the presidency of the Irish practitioner, T. H. Simcocks, of Drogheda, it nearly foundered; but it was again invigorated when John Malcolm replaced Banham as Secretary.

VII

Steel's subsequent career, as an officer in the army veterinary department, from 1882 until the date of his death in 1891, in India, is so remarkable that a whole volume could well be written upon it. It is only possible here to touch on a few of its main features. How different the whole veterinary situation in India would have been had he lived on until he had completed his plans is now hard to estimate. At the time of his arrival in India there were only two qualified

* " . . . *To practice the veterinary profession as a private practitioner requires a tact and a knowledge of commercial affairs which I do not possess, and, therefore, I consider the Army Veterinary Department the most suitable branch of the profession for me.* In leaving the College I hope my scientific work will not cease. The veterinary profession, in which I have the highest interest, is making rapid strides, and affords ample opportunities for work.

" *I have on hand at present a share in a matter of the greatest importance which will, I trust, advance the whole profession in the country . . .*" (our italics). [That statement, of course, refers to Steel's share in organising The British Veterinary Congress of 1881, the forerunner of our present "National."]

veterinarians appointed to minister to the civilian needs of that huge territory, both seconded from the Army, namely, Joshua Nunn in the Punjab and James Mills in Madras.* We have already alluded to his early work in Burma in confirming Griffith Evans's investigations on *surra*, and in that work he displayed conspicuous gifts for original research. To make any real headway in coping with the enormous problems awaiting solution in a territory of the magnitude of India, however, in which the inhabitants were almost entirely engaged in agriculture and dependent upon their cattle, Steel conceived that his energies must be primarily directed towards the creation of a powerful cadre of well-educated Indians who could, in time, undertake the full responsibility of resolving those problems themselves. The accounts of his various activities to achieve that goal make such impressive reading at this moment when the Indians themselves have assumed the responsibility of self-government that one cannot help but lament the tragedy that he did not survive so that, at any rate on the veterinary side, they were not placed more firmly on their feet. Things might, of course, have been much worse in that respect; but that does not absolve us from regret that they could have been better.

Firstly, therefore, a few words need to be said in regard to Steel's pioneering of veterinary education in India, at Bombay. The Bombay Veterinary College was started in 1886 (that is, four years after Steel's arrival in India); and by

* It was not until 1892 (see Smith's *Hist. R.A.V.C.*, p. 192), the year after Steel's death, that an Indian Civil Veterinary Department was created by the special recruitment of 17 army veterinary department officers for continuous service in India in a civilian capacity, J. H. B. Hallen (1839-1901)), an officer of great merit, becoming its first head, with the title of Inspector General, Civil Veterinary Department.

Commenting editorially (*Vet. Rec.*, 1891-92, *4*, 384) on the War Office circular calling for recruits, Hunting said: ". . . The candidates will be bound for continuous service in India, and will be called upon to resume military duty in the event of serious war—whatever that means. The circular goes on to say that the Civil Department will receive the same pay as the military plus a staff allowance. So far good; but we wish to draw the attention of intending candidates to the fact that nothing is said about ordinary leave, sick leave, retiring allowance, etc. They will get a staff allowance, and will serve continuously in India. These omissions deserve caution. *To be an uncovenanted Indian civilian is not the happiest way of making provision for the future, and the Government of India enjoys a very evil reputation in regard to its dealings with the Veterinary Department* (our italics). On this account it is desirable that all important points should be settled in black and white before anyone volunteers for what is perpetual exile, according to the circular. It is not our desire to prevent officers joining this department, but we advise them to take such ordinary precautions as are laid down in any emigrant office. Holding these views, it seems to us a little hasty to issue a call for volunteers by return of post."

It is now, of course, too late in the day, in view of the drastically changed political situation in India, to dwell on the strictures passed by Hunting upon the treatment meted out by the Government of India (that does not mean to say the Indian, but the craven no less than imperious bureaucracy that eventually went by that name) to its veterinary officers, and especially to the most truly deserving of them who had sacrificed much to render abiding service to India and the Indians (see *Vet. Rec.*, 1951, *63*, 14). It is not outside our knowledge in this respect what was the lamentable treatment accorded to the dependants of the subject of this article, J. H. Steel, for example, who had martyred himself early, as is our duty now to recount, in the cause of India.

"That incident would be of restricted interest," to quote from Leclainche who had dwelt upon similar incidents in France (see *Histoire de la Médecine Vétérinaire*, 1936, p. 263), "if it did not characterise the procedures of bureaucracy in all countries, under all systems of government . . . and at every period of history," which was, in short, according to him, to discourage and suppress by every sort of devious means all possible rise of first-class professional or scientific talent and ability which was not docilely amenable to its authority, while, we would add, rewarding and honouring mediocrity.

the time of his death, in 1891, it was rapidly attaining a prominent position in the country. There were already in existence, connected with the Army, a few schools where instruction was imparted to Indian subordinates, besides the school at Lahore, where, under Kettlewell, a fairly comprehensive course was given in the vernacular. At Bombay, however, an attempt was made by Steel to establish a school which from the outset would turn out men who would have received a training at least fully the equivalent of that given at the British schools and for which the R.C.V.S. awarded its diploma. A movement to establish a school at Bombay seems to have been under way for some time before Steel's arrival. It then became, under his influence, active; and in a Resolution (No. 4002) of the Revenue Department of the Government of Bombay passed in 1883, it was stated that the Governor (Lord Reay) in Council was of opinion "that the project for the establishment of a Government Veterinary College, with a hospital attached to it, is one likely to prove of great benefit, and merits careful consideration. It is difficult to overrate the importance of agriculture and agricultural stock in India; and, seeing that the value of agricultural cattle which perish from plague and other epidemic diseases in India is calculated at £6 million sterling per annum [this was certainly a gross underestimate, even in the currency of the time] it is obvious that any measure which would tend to check this great mortality and heavy loss, by increasing the knowledge of the nature of, and remedies for, the various diseases which attack cattle, and provide a class of persons competent to treat scientifically the different maladies of which cattle are subject, would prove of immense advantage to the State and to the innumerable owners of livestock comprising the mass of the cultivators. The Governor in Council is, accordingly, pleased to direct the formation of a Committee to consider and report upon the scheme for the establishment of a Government Veterinary College and Hospital . . ." (see *Vet. Rec.*, 1890-91, *3*, 146, 448).

The above passage is a momentous one in the history of veterinary progress within the British Commonwealth. It antedates by almost precisely sixty years any similar authoritative pronouncement expressing the acceptance of full State sponsorship for veterinary education by the British Government. Its terms are, moreover, categoric inasmuch as they leave no manner of doubt (any more than the Minister of Agriculture's [Mr. Hudson's] letter in 1943 did) that a State authority was prepared to sponsor veterinary education at its highest level. What is remarkable (and paradoxical) is that the pronouncement should have been made within a territory which until then had been bereft of essential veterinary services.

Following upon this pronouncement, it was announced to the Committee appointed that a wealthy Bombay Parsee merchant, Mr. (later Sir) Dinshaw Manockji Petit, Bart., had made over to "the Society for the Prevention of Cruelty to Animals" a building and sites (approximately 40,000 square yards) in the Parel quarter for the establishment of an animal hospital. The Society then offered to place this property at the disposal of Government for the purposes of the proposed veterinary college and hospital, together with all the

animals sent to, or collected by, the Society, "which would also undertake all charges on account of food of animals, medicines, and so on, on the condition that the teaching staff of the College be supplied and paid by Government and the buildings maintained in proper repair." This offer was accepted and building began in January, 1885, so that teaching actually started on August 2, 1886, the course extending over four collegiate years. This was actually in excess of that demanded at the time under the R.C.V.S. curriculum, which was not extended to four years until 1894. The annual reports of the school during this time give us a precise indication of the rapid progress made year by year. On March 18, 1890, His Excellency Lord Reay, the Governor of Bombay, signed and presented the Diplomas to the first batch of graduates (namely, those who obtained their Diplomas in 1889). He also laid the foundation stone of the Sir Dinshaw Manockji Petit Patho-bacteriological Laboratory, and opened the Hospital Isolation Ward. For the first time, too, Steel gained entry to the refuges for sick and decrepit animals (pinjrapoles) to minister veterinary attention.

At the opening of the above laboratory by the then Governor (Lord Harris) in March, 1891—that is, very shortly after Steel's death—it was claimed that "perhaps in the extension of veterinary science, Bombay Presidency had shown its determination to keep to the forefront of educational enterprise more than in any other direction of educational enterprise and was prepared to make considerable financial sacrifices to ensure the education of veterinary graduates." Throughout India, it was said, there were plenty of empirics; and, at the time, Bombay had the only college in India which could turn out men capable of bestowing intelligent treatment on sick animals. Every endeavour was being made to improve the instruction, consolidated with a systematic record of cases, and individual responsibility had been introduced. The result was that the rest of India was appreciating the efforts that were being made in Bombay to the extent that the graduates were offered employment, sometimes fairly lucrative, in other parts. Besides, animal dispensaries had been opened in various districts in the Presidency and in Indian States, and the Government was doing as much as was legitimate in the direction of stationing veterinary practitioners in these dispensaries, two men being appointed to each dispensary so as to give opportunities always to one of them to proceed on tour. It was therefore essential, concluded the Governor, that a steady flow of men should come to the College from all parts of India and a steady flow should proceed outwards towards employment. It was "absolutely necessary," he stressed, that those who saw students treat animals should see them "deal with the animals courageously and in a manly way. Veterinary practice is, after all, rough work, and the surgeon must show no timidity with the animal . . . there should be as much teaching and practical work as possible in the forge." Among a population whose traditions impelled them to scorn manual work as beneath the notice of their educated classes, it says much for Steel's "infectious enthusiasm" that his Indian disciples raised no objection against the imposition of rigid training in practical work.

Shortly before his death he was pressing for reciprocity with the R.C.V.S.;

XUM

then, having failed to obtain it, it seems that he was on the point of applying for affiliation with the University of Bombay (see *Vet. Rec.*, 1891, *3*, 334).

Secondly, to collect the information which was sorely needed upon the distribution of animal disease in India, Steel founded in 1882, in conjunction with his former student colleague, Frederick Smith, and helped by his father, the *Quarterly Journal of Veterinary Science in India.* Having scrutinised his copious literary output, the writer believes that Steel (like Fleming) was at his happiest and best as a journalist. Somehow, in his other writings, his fluency gives one often the impression that his ideas did not proceed from great depth or after the exercise of severe critical judgment* (in both of which respects McFadyean was soon to display his astonishing powers to the profession). In the *Quarterly Journal,* however, for the first time we have a periodical somewhat approaching John Gamgee's short-lived *Edinburgh Veterinary Review* in editorial brilliance, the editorial articles being often highly topical and superb in literary presentation, and the surveys of the several problems, which must have cost a great deal of labour in obtaining the details, furnishing for the first time the information that was essential to promote measures for the control of disease in India. For some years, we learn, the *Quarterly* did not half pay its way to its editors. After 1890, upon Steel's death, this invaluable journal lapsed; and even though under Pease later on a *Journal of Tropical Veterinary Science* was conducted for a few years, for want of competence and enthusiasm among those destined to hold responsible positions in the Indian veterinary services nothing was really attempted on the scale and at the high level of Steel and Smith's *Quarterly.*

Thirdly, in many other ways Steel asserted his indomitable spirit on the life of India. He founded the Bombay Veterinary Medical Association, on the same footing as the British veterinary societies; he was made a Fellow of the University, with a seat on the Senate, and he was promoted by the Governor to be Justice of the Peace, and, besides, carried out investigations into cattle plague and other diseases. Smith maintains that it was while he was investi-

* For example, on p. 133 of the second edition (1886) of his *Diseases of the Ox* he makes the statement: ". . . *Fresh blood must be introduced into a herd with a scrofulous* [*i.e., tuberculous*] *tendency, breeding in-and-in avoided;* . . ." (our italics). Yet in a footnote, he makes it evident that such hoary notions must stand in need of total abandonment to a discerning mind in the light of Koch's discovery (1882), by then, of the true cause of the disease. For, there, in the footnote, Steel says: "*Koch's brilliant discovery of the tubercle bacillus has revolutionised the diagnosis of tuberculous disease in man* . . ." (our italics).

The late J. A. W. Dollar had, in fact, some years ago drawn our attention to such weaknesses in Steel's textbook writings. But such weaknesses are indeed almost universal among fluent textbook writers. We can readily discern this phenomenon at this present day among the Germans, who are characteristically, almost, the textbook writers *par excellence*; while the British, on the whole, prefer to confine themselves to the more exacting work of recording, factually and critically, the records of original experiments and observations. To his credit, Steel makes no pretence at imparting such exact information, that task being impossible, in his view, in the light of the scantiness of exact knowledge then available and the backward state of the profession in regard to education. His aim was to collect and collate what was then on record in the periodicals for the benefit of the practitioner, who, otherwise, had no trustworthy compendium for reference, Steel's view again being that the original observations of the British school of private veterinary practitioners were much superior, in any case, in merit to those recorded by their counterparts in the profession abroad. In that respect, Steel was undoubtedly perfectly right, as the present writer (as well as F. Smith) has had occasion to stress elsewhere.

YUM

gating cattle plague that he contracted the disease, liver abscess, which ultimately proved fatal. ("He lost his way," Smith says, "and, night coming on, was compelled to remain where he was. He was in thin white clothing and spent the night in a tree, which was safer than on the ground. He was chilled to the bone by the heavy dew and cold night, and liver trouble followed.") In the light of our present-day more extensive knowledge of the specific cause of tropical liver abscess (*Entæmœba histolytica*) it is hard, however, to accept Smith's version of the origin of the affection. The Parel quarter of Bombay at the time, as we learn from Steel's own reports, had an evil reputation for deadly infections, while at its best the climate of Bombay is certainly not conducive to radiant health. Thus, we are told, two years after he started the College his robust health (as Hunting put it—though, on the contrary, the *Veterinarian* stated that "he was never very robust, although always very energetic") gave way to the above trouble, but he would not go home, toiling on until a *locum tenens* could be found to take his place. He returned to this country in 1888, and at the Netley Hospital the hepatic abscess pointed externally, and Steel's life was spared. He bore his sufferings uncomplainingly, and while bed-ridden wrote part of his book on *Diseases of the Dog* and collected and wrote part of his book on *Diseases of the Sheep* and put together his notes on *Diseases of the Camel.* "Work," as Hunting said, "was essential to his existence; he could not live without it."

Contrary to all medical advice and the insistence of his many friends, nothing would now deter him from returning to India, although he well knew that to return—at any rate before he had remained in England a few years to recover fully—was almost certain to prove fatal. During his few months' absence, his *locum tenens* (Veterinary-Surgeon Pottinger) sickened from the same disease, and died. Steel felt the loss acutely, but he never swerved from what he believed to be his duty. His book on *Diseases of the Elephant* had appeared in 1885, and after his return that on the *Dog* in 1887, the *Camel* in 1890, and the *Sheep* also in 1890. During the remaining three years, nearly, of his life in India, he carried on his duties calmly and without intermission, doing the work at his School of three or four lecturers, besides attending to the practical work and the many outside calls on his time. In particular, he took a prominent part in the Educational Conference at Delhi, where "he created a most favourable and lasting impression in announcing his views on the veterinary education of Indians."

As was expected, a fresh abscess formed in his liver, but he stoutly refused all attempts to persuade him to return home. It was only a few days after he ceased to sit on an important committee at Poona on questions concerning veterinary science that his last illness seized him. "Poor Steel's latter days," Hunting said, "were full of misery; cut off by thousands of miles from those he loved best, steadily going downhill, he faced death like a hero. . . . His life is a noble example of self-sacrifice, hard work, and unremunerative toil. His place can never be filled, and his death has created a wound in the hearts of his friends, which time alone can heal. As *one of the brightest ornaments in*

our profession he sets to its younger members an example which, excepting so far as neglecting their health, they would do well to follow. . . ." And, writing many years afterwards, his colleague, Smith, said: "*With his death the Service lost its ablest young officer, a scientist and worker whose enthusiasm was infectious.*"

The sober terms in which the Government of India communicated to Lord Harris, the Governor of Bombay, an expression of its measure of the loss sustained by Steel's death perhaps give to posterity a more striking impression of his work for that country. They will, too, arouse in the profession a just pride that one of its own members merited such a tribute:—

"The Government of India have heard with much regret of the decease of this able and zealous officer, whose career, had he been spared, would have been highly distinguished both departmentally and in the spheres of veterinary education and science. As an author, his works were favourably known to the profession both in India and England, and he succeeded in making valuable contributions to bacteriological research. In the launching and subsequent management of the Bombay Veterinary College, Mr. Steel is shown by the reports received from the Bombay Government to have displayed unusual capacities both of organisation and instruction, with the satisfactory results that the veterinary education furnished to the students is of a higher character than has been previously attained in India, and that the practical efficiency of those who have obtained the College diploma has, in several instances, already been proved by their employment under various Governments and Native States throughout the Empire."

"He displayed," Lord Harris added, "the greatest energy and zeal and devotion in the multifarious duties which fell upon his shoulders . . . and it was in connection with the subject of his profession, which was a labour of love to him, and whilst pursuing his object and spreading veterinary science throughout India, that he actually died . . . a most devoted and zealous and an honest servant of Government."

VIII

The news of Steel's death cast such unprecedented gloom over the profession at home in Britain that at once a movement was started to create some permanent memorial to his memory. The record of the proceedings of the influential committee set up is readily accessible (*Veterinarian*, 1891, *64*, 218; *Vet. Record*, 1890-91, *3*, 306, 419, 460, 480, 515, 589; *ibid.*, *4*, 27, 32, 41, 83, 260, 397, 401, 459, 491, 607).

Briefly, a small sub-committee was formed under the presidency of J. Roalfe Cox, F.R.C.V.S., with F. Raymond as Hon. Secretary and George Fleming and Frank Wragg as Joint Hon. Treasurers. To economise in the matter of expense the profession was not circularised, but the appeal was made through the veterinary periodicals; the sum of £254 4s. 3d. was collected, to which it was hoped to add the surplus from the 1881 Congress, amounting to about £60. The final meeting of subscribers was held on May 4, 1892, when resolutions were passed: (1) that the memorial take the form of a reward for

scientific and literary work of merit connected with the profession, and that it be limited to members of the R.C.V.S.; (2) that the reward be in the form of a medal, to be designated the "John Henry Steel Medal," and that the medal be of gold, and of appropriate form and device; (3) that the Council of the R.C.V.S. be asked to accept the amount subscribed, conditionally upon their agreeing to form a Steel Memorial; (4) that in the event of the Council accepting the amount, and agreeing to the conditions, the Treasurers be empowered to hand over the money to the Council; and (5) that in the event of the fund left in the hands of Mr. Banham by the late National Veterinary Congress being forthcoming, it be added to the J. H. Steel Memorial Fund.

These carefully-worded resolutions are reproduced verbatim because it is evident that from the sagging of interest in complying with the highly exalted intentions of the founders, to reward merit and perpetuate the memory of J. H. Steel as we have now recapitulated it, there was some intrinsic weakness in the drafting of them.

Altogether, during the 54 years since the Memorial was founded, 24 awards have been made, but the awards have been made at most irregular intervals. From 1897 to 1900, inclusive, two awards were made yearly—that is, eight in all. Then, from 1901 to 1924, single awards were made approximately triennially—that is, eight. This spacing was continued (excepting that in the year 1928 two awards were made) until 1941—that is, seven. Then there occurred a long interval of nine years when it seemed that awards had lapsed, when last year, 1950, an award was again made (incidentally, to one of the editors of this journal, Sir Thomas Dalling).

This matter, in the highest interests of the profession, can no more be dismissed as trivial than it would be for the State to allow its most exalted parallel honour, the Order of Merit (which, too, is strictly limited as regards the total number of awards) to become lowered in esteem.

How some necessary revision in the conditions of the award can best be undertaken we would not presume in this place now to suggest.

IX

Having been invited specially to contribute a historical review of the progress of the veterinary profession between 1851 and 1951 in celebration of the Festival of Britain, it may seem strange that we have not been able to present a smooth, connected narrative of the whole period. Not only would it be of little interest, we contend, if we had made the attempt, but certainly as concerns the incidents of the last decades we are much too near them to assess their significance properly in the light of history. That task, however, we hope later in some measure, at least in part, to discharge. What the occasion has afforded, on the other hand, is an opportunity to trace a few of the most outstanding movements within the profession during the century properly to their roots. As we said, in the course of an earlier instalment, grave errors might have been averted during recent years if the true history of some of the major issues had been available and properly understood.

XUM

With a fine psychological discernment, the South Bank Exhibition was definitely closed on October 31 last. To have continued longer might have caused a feeling of satiety in the minds of the public. What was actually achieved is now hard to say. The rapid subsequent turn-over in Government resulting from the General Election doubtless to some extent has deflected profound reflection upon the Festival and its meaning and results. Those who belonged to our profession and visited the exhibition may have come away wondering whether anything whatsoever of direct interest to it was on view. Those, again, who may even have been tempted to regard the whole display as a trifle puerile may well be asked how they could possibly have put on exhibition any collection illustrating better not only the material but also the moral and cultural advance during the century.

What was impressive to the discerning, and reverent, visitor was the array of names of devoted and zealous pioneers in the several fields of expanding knowledge to whom the present generation owes gratitude.

Equally impressive it has been meanwhile in the researches we have been privileged to undertake into the history of our own profession in this country to discern the names of those to whom we, within our own domain, owe especial gratitude.

Steel's whole life, we are assured by Hunting, was guided by the lines in Longfellow's poem :—

"Lives of great men all remind us
We can make our lives sublime,
And, departing, leave behind us
Footprints on the sands of time.

Footprints that perhaps another,
Sailing o'er life's solemn main,
A forlorn and shipwrecked brother,
Seeing, may take heart again."

All his endeavours when completed were to him just some more "footprints." Perhaps, on that note, we can fittingly suspend, for a time, these articles.

ACTINOMYCOSIS IN THE DOG

By WASSEF MANSI

Ministry of Agriculture and Fisheries, Veterinary Laboratory, Weybridge

WHILE working on canine-distemper virus at the Veterinary Serum Institute, Cairo, between May, 1943, and May, 1947, many cases of actinomycosis in dogs were noticed.

Every year cases appeared between April and October, but none was ever encountered during the winter.

The affected dog usually showed a rise in temperature, dullness, and swollen face (Fig. 1). The swelling of the lymphatic glands developed very quickly: they would increase from the size of a hazel nut to a walnut in a matter of a few hours. In the majority of cases all the lymphatic glands were affected (Figs. 1 and 2). Bursting of local abscesses, sometimes associated with a drop in temperature, did not indicate recovery. The case almost invariably ended with the death of the animal. In a few instances multiple lentil-sized, greyish nodules were observed distributed throughout both lungs. The peritoneal and pleural cavities were usually filled with dark, blood-stained, purulent fluid which contained many small, soft, yellowish granules. The sublumbar and the deep inguinal lymphatic glands contained abscesses, and their bursting was responsible for the peritonitis.

The course of the disease was very short and death usually occurred within three to five days from the appearance of the swollen glands. McGaughey *et al.* (1951) reported survival for eleven days: this may have been due to treatment.

An organism was isolated from both the purulent materials in suppurating glands and from lung nodules. It was a Gram-positive, aerobic, slightly acid-fast (resisted decolorisation with 5 per cent sulphuric acid) organism, and occurred as dense mycelia. The filaments showed true branching. On Sabouraud's medium, mycelium was not produced. Only small coccal forms were found in smears made from cultures.

This organism appears to belong to the same group of actinomycosis as those described by Ginsberg and Little (1948) and McGaughey *et al.* (1951).

Experimentally, the subcutaneous inoculation of young puppies and full-grown dogs with fresh, purulent material and with suspensions of fungi grown in cultures, did not produce any ill effect. During the period 1943 to 1947, 24 dogs were inoculated at the Serum Institute, Cairo.

Acknowledgment

I am grateful to Mr. J. R. Hudson for his encouragement in preparing this note.

REFERENCES

McGaughey, C. A., Bateman, J. K., and Mackenzie, P. Z. (1951): *Brit. Vet. Jl.*, *107*, 428.
Ginsberg, A., and Little, A. C. W. (1948): *Jl. Path. Bact.*, *60*, 563.

FIG. 1. — Alsatian bitch showing enlargement of the lymphatic glands of the head and of the left foreleg.

FIG. 2.—Enlargement of the superficial inguinal gland of the same animal.

(*Article by Mansi, page* 14)

THE ECOLOGY OF MASTITIS
A Study of a Group of Northumberland Farms

By ERNEST A. GRAY,

National Agricultural Advisory Service, Ministry of Agriculture and Fisheries Eastern Province, Anstey Hall, Trumpington, near Cambridge.

THE survey described in this paper was carried out during the years 1943 and 1944, when the writer held the official post of Bacteriologist in the Veterinary Laboratory, Kings College, Newcastle-on-Tyne, England. In the autumn of 1944, illness caused him to give up veterinary work, which he has not since resumed. He has, therefore, not altered the references but let them stand as the sources of information available to him at the time the work was carried out. The topography of the district, of course, has not changed, nor has there been any material alteration in the methods of milk production on the farms described. The writer is informed, however, that possibly owing to therapeutic treatment he adopted immediately before his illness, and general control measures he advocated, and which have since been carried out, the incidence of mastitis in the valley farms particularly is now very low, and mastitis as a whole is no longer a serious problem in the district. In presenting the paper, the writer is very glad to express his appreciation of the public-spirited policy of the owner of the valley which enabled the survey to be made. His most grateful thanks are also due to J. H. Bonner, the estate manager, for records and practical help, and to the farmers who welcomed him to their homes, made him free of their premises, and gave him every assistance. He is indebted also to his technical assistant, Miss Gillian Ainslie (now Mrs. Moore), who was literally his right hand, and he must thank, too, Dr. A. Milne, who made the statistical analysis, and Mr. W. Lyle-Stewart, M.R.C.V.S., head of the Veterinary Department, for very useful practical advice and suggestions.

Foreword

MASTITIS IN GREAT BRITAIN.
OBJECT OF THE PRESENT SURVEY.

Mastitis or mammitis of dairy cattle is a disease of considerable economic importance and regarded as one of the four major diseases of livestock. The udders of dairy cows and heifers are invaded by bacteria, the udder tissues become inflamed, and the lactiferous glands are progressively destroyed until one or more of the four quarters of the udder become " blind " or sterile. The disease may be either acute or chronic, but in the majority of cases takes a slow, insidious course. Large milking herds of high-yielding cows are especially affected. A variety of organisms are responsible. *Streptococcus agalactiæ* (group B streptococci [Topley and Wilson, 1948]) has been estimated to infect one-third of the milking cows of Great Britain (Malcolm, 1940). The National Veterinary Medical Association of Great Britain and Ireland (1940) states that those forms of mastitis responsible for the greatest loss in milk are as follows :--

1. Mastitis due to *Streptococcus agalactiæ*.
2. Mastitis due to staphylococci.

3. Mastitis caused by the diptheroid bacillus, *Corynebacterium pyogenes.*

4. Mastitis caused by streptococci other than *S. agalactiæ* (e.g., streptococci of groups ii, iii, and iv [Topley, 1942]).

The Association further observes that infection by *S. agalactiæ* accounts for 80-90 per cent of all cases of mastitis, whether clinical (acute) or sub-clinical (chronic), and is responsible for a very heavy annual loss of milk.

Observations by the author indicate that mastitis is widespread throughout Northumberland, but that the type of infection varies in different districts. Although the disease is so common, he is not aware that any systematic study has been made of it in the county. In the present work a report is made of a detailed study of mastitis on a group of Northumberland farms during the two years 1943 and 1944.

Part One

1. Description of Areas.
2. Methods of Examination.

1. *Description of Areas (Topography).*

In January, 1943, a survey was begun for the incidence of the organisms of mastitis in the dairy cattle of eleven selected Northumberland farms. With two exceptions, the farms lay in or above the valley of the West Allen river. This stream, rising from a moorland watershed at 1,000 feet (330 m.) above sea level, descends over a course of about seven miles (approximately 11.4 km.), to unite at 500 feet (200 m.) above sea level with the East Allen river, and their united waters then cut a short, precipitous channel to the South Tyne river.

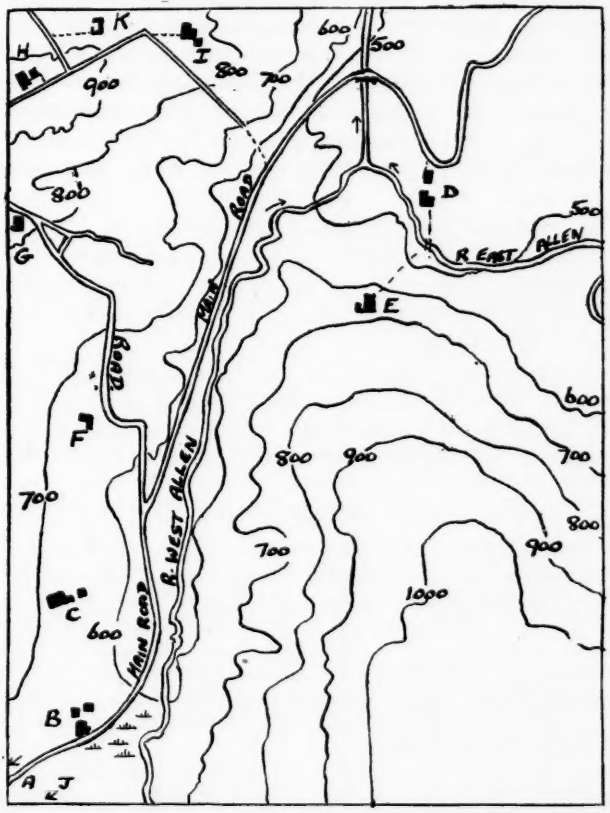
The geological formation of the district is the Upper Carboniferous series. Shortly before they unite the East and West Allen rivers are separated by a spur of carboniferous shales, limestones, and sandstones, through which the West Allen cuts a deep, narrow gorge about three miles (4.83 km.) in length. Except on its moorland watershed, the West Allen throughout its course is almost wholly enclosed by high bluffs covered by thickets of hazel and alder, and by birch, beech, oak, hazel, spruce, and sycamore trees. In sharp contrast, the East Allen skirts the Eastern edge of the spur and its course is open. It flows over alluvial drifts and gravels, and its banks are formed by slopes of old, permanent grassland, studded by oak and beech trees, which rise gently to the moors at the summit.

The predominance of calcareous formations materially affects the acidity of the soil. At river level in both valleys the *pH* of the soil is alkaline, but as the banks of the West Allen, for example, are ascended the soil reaction becomes increasingly acid, the *pH* range, determined colorimetrically, passing through 7.5 on the river meadows to 6.5 on the hillsides, and 4.5 on the moors at the summit.

The geological conformation of the valleys sharply divides the farms of the district into two types—hill farms and valley farms. The hill farms are open and exposed, their soil is thin and acid, and they tend to be of uniform type. The valley farms can be divided into two types, those along the course of the West Allen, which are enclosed by high, steep banks and sheltered by trees—varieties of beech (*Fagus* sp.), chestnuts (*Castanea* sp.), elms (*Ulmus* sp.), lime

(*Tilia* sp.), and sycamore (*Acer* sp.)—and those on the course of the East Allen and the upper reaches of the West Allen, which are open and exposed, where only a few trees, such as the beech (*Fagus* sp.), the hazel (*Corylus* sp.), and goat willow (*Salix caprea*), are found, and where conditions for agriculture in general approach those of the hill farms.

On both the valley and hill farms the pasture is old permanent grassland. On the valley farms meadow grasses (*Poa* sp.), perennial ryegrass (*Lolium*



The topography of the district, showing the contours, roads and the farms surveyed in relation to the West and East Allen Rivers. The farms are blocked in and shown by capital letters. Scale: approximately 2 inches to one mile (0.61 m. = 1.6 Km.). (Reproduced by permission of the Director General Ordnance Survey.)

perenne), and fescues (*Fescue* sp.) are found, but very little Timothy (*Phleum pratense*) or clovers (*Trifolium* sp.). The grasses on the hill farms are largely represented by cocksfoot (*Dactylis glomerata*) and bents (*Nardus stricta*), mixed with purple moor grass (*Molina cærula*) and tufted hair grass (*Deschampia cæspitosa*). On certain farms, to a limited degree, some of the permanent grassland has been ploughed up and re-seeded. Temporary leys, and on one farm the cultivation of peas, vetch and lucerne for ensilage, have graded up the grazing hitherto available.

XUM

The distinctions between the farms of the valley influenced their selection for the survey. One farm was chosen on the banks of the East Allen, a second above it near the union of the rivers, two farms were selected at river level in the West Allen Valley, a fifth on the watershed of the West Allen, whilst the sixth, seventh, and eighth farms lay on the slopes above the West Allen between the 600- and 800-foot (200-266 m.) contours. The remaining three farms were all hill farms lying at 1,000 feet (330 m.) or over above sea level. For the purpose of the survey the farms are labelled A to J.

The map of the district is copied from the local Ordnance Survey map, but reduced to a scale of two inches to one mile (0.61 m. = 1.6 km.). It shows the position of the farms and the principal topographical features of the district. Farms A and J could not be shown, as their inclusion would make the map of undue length. Farm A lies one and a half miles (2.4 km.), and farm J nearly five miles (approximately 8.0 km.) along the road which passes off the map at the left-hand corner.

It will be noted that the buildings of the hill farms H, I and K lie at or about the 900-foot (300 m.) contour. Their grazing fields, however, run up behind the buildings to 1,000 feet (330 m.) or over. On the right hand of the map will be noted the massive spur, rising to 1,000 feet (330 m.) which divides the West and East Allen rivers.

The breed particularly favoured in the district is the Dairy Shorthorn. Eight of the eleven farms kept their own bull. Farm B possessed a Jersey bull. Only farms A, B, and J had produced milk on any commercial scale before the war. Other relevant information is summarised in Table I:—

TABLE I.

Farm.	Position.	No. of cows.	Method of milking.	Buildings.
A	Valley of West Allen.	26	Machine milking.	Satisfactory.
B	Valley of West Allen.	37	Machine milking.	Good.
D	Valley of East Allen.	23	Machine milking.	Good.
E	Bank above East Allen.	34	Hand milked.	Satisfactory.
C	Bank above West Allen.	26	Hand milked.	Fair.
F	Bank above West Allen (600-foot—200 m.—contour.	18	Machine milked.	Good.
G	Bank above West Allen (800-foot—266 m.—contour).	18	Hand milked.	Satisfactory.
J	Watershed, West Allen.	29	Hand milked.	Fair.
H	Hill farm (1,000 feet—330 m.).	22	Hand milked.	Bad.
I	Hill farm (over 100 feet —30 m.).	18	Hand milked.	Bad.
K	Hill farm (1,000 feet—330 m.).	31	Machine milked.	Good.

Of those diseases affecting reproduction and/or lactation, some degree of contagious bovine abortion exists in the valley, but the incidence is low. *Tricho-*

monas fœtus infection has not been diagnosed in the valley, although the writer was the first to show its existence in Northumberland. On certain fields mineral deficiency exists, but a mineral deficiency *per se* is only marked in the young stock.

2. *Method of Examination.*

Each farm was visited twice at an interval of two months. Bulk samples of fore-milk from all four quarters of the udders of both drying-off and in-milk cows were drawn into sterile tubes in amounts of 10 c.c. Before sampling, the teats and udders were carefully cleansed with chloros, 1-1,000, and the hands of the operator were washed in the same solution between each sampling. Two sets of cloths were used for washing the teats and udders, and used in alternate rotation, so that one cloth was always soaking in the solution. The first jets of milk were discarded and the fore-milk drawn direct into the tube, the rubber bung of which was not removed until the sample was taken.

The tubes were placed in the refrigerator overnight, and on the following morning the cream was inoculated into thallium acetate broth, and the media incubated for 48 hours. A preliminary reading was taken at 24 hours, when any positives were removed. Abnormal samples, or samples from cows with a history of mastitis, were deep-plated out in dilutions of 1-10 and 1-100, in normal saline in plain blood agar, and blood agar containing crystal violet 1-10,000, and incubated for 48 hours at 37°.

Samples inoculated into thallium acetate broth were passed as positive for *Str. agalactiæ* if the characteristic flocculent growth of that organism appeared and smears of the deposit showed long-chain streptococci in palisade formation.

The blood plates, especially those containing crystal violet, were passed as positive for *Str. agalactiæ* if Beta-hæmolytic colonies were observed at 24-48 hours and long-chain streptococci in palisade formation were detected in smears of the inoculum.

Doubtful samples in thallium acetate broth were sub-cultured by plating out the samples in plain blood, and in crystal violet blood-agar plates, in the same manner as suspect cases.

Plates from such sub-cultures, or from suspect cases which gave an anomalous reaction, were further examined by isolating individual colonies and noting their biochemical reactions, in particular their effect upon æsculin, sodium hippurate, mannite, glucose, saccharose, raffinose and insulin. Alternatively, a precipitation test was carried out against group B and group ii streptococcal antisera.

In addition to the two herd tests carried out at each farm, all the farms were visited from time to time to note whether any fresh cases of mastitis had occurred since the last visit. The milk of any suspect cow was then examined by the method of deep blood plating only, and individual quarter samples were drawn for this purpose.

XUM

Part Two

1. Results of the Examination.

2. Summer Mastitis.

1. *Results of the Examination.*

Table II summarises the results of all the examinations:—

TABLE II.

Farm	No. of cows	*Str. agalactiæ*	Other streptococci	Staphylococci	Other organisms
A	26	9 cows. All carriers.*	—	—	—
B	37	10 cows. All carriers.	1 (group C). A clinical case.†	—	—
C	26	—	—	2 cows. 1 carrier. 1 clinical case.	—
D	23	1 cow. A carrier.	—	5 cows. 4 carriers. 1 clinical case.	—
E	34	—	7 cows (group iv).‡ 4 carriers. 3 clinical cases.	2 cows. Both carriers.	—
F	18	—	2 cows (unplaced). Both carriers.	2 cows.	—
G	18	—	3 cows (1 group iv). All carriers.	—	—
H	22	—	4 cows (3 group iv). 2 carriers. 2 clinical cases.	2 cows. Both carriers.	—
I	18	—	2 cows (group ii). Both clinical cases.	1 cow. A carrier.	—
J	29	4 cows. All carriers.	2 cows (group ii). Both clinical cases.	—	—
K	31	1 cow. 3 carriers. 1 clinical case.	—	1 cow. A carrier.	3 cows. A gram-negative bacillus isolated from one case

* *Carrier cow* indicates that no clinical disturbance was noted.
† *Clinical case* indicates open, acute mastitis.
‡ The numbers or lettering in the group "Other streptococci" indicate their particular classification (Topley and Wilson, 1942).

The result of two herd tests and of examination of isolated cases of acute mastitis on the 11 farms had revealed that mastitis caused by *Str. agalactiæ* was present on five only out of the 11 farms—farms A, B, D. J, and K.

One case only was detected on farm D, where the dominant infection was staphylococcal. This farm had the largest number (five) of cases of potential mastitis due to staphylococci.

Farm E presented a series of obscure latent and open cases of mastitis due to streptococci of group iv (Topley, 1942).. From two open cases of mastitis on this farm, *Str. lactis,* a saprophytic streptococcus responsible for souring of milk, was isolated from the pus.

Str. agalactiæ, however, was responsible for the largest number of cases of mastitis. The percentage of infection was as follows:—

Total number of cows—253.

Number of cows affected by *Str. agalactiæ,* 28—11.06 per cent.

Number of cows affected by other streptococci, 23—9.09-9.1 per cent.

Number of cows affected by staphylococci, 13—5.13 per cent.

Number of cows affected by other organisms, 3—1.18 per cent.

2. *Summer Mastitis.*

During the summer of 1943 it was expected that a number of additional cases of open or clinical mastitis would occur. Such had been the general rule on the 11 farms in previous years the valley farms on the whole being less affected.

During the summer of 1943, however, open cases of mastitis occurred on only three of the 11 farms under survey. Farm D had two acute cases, both in cows previously detected as carriers of the causal organisms, staphylococci. Both cows were in full milk. No cases occurred in the dry cows or heifers.

Farm K, a hill farm, had three acute cases, all in cows in full milk. One occurred in a cow previously detected as a carrier, and a second in a cow not previously detected as a carrier, but which had a history of mastitis on a previous occasion. Staphylococci were isolated as the causal organisms in each case. In addition, a beta-hæmolytic streptococcus of fæcal type was isolated from the cow which had previously suffered from mastitis.

On farm B a very serious outbreak occurred between July 18 and August 25. All the cases occurred in cows in full milk.

The herd of this farm had been sent as a temporary measure into an ornamental park of old, permanent grassland studded by varieties of beech, spruce, hazel, and sycamore, and enclosed on two sides by woods of beech and hazel.

From July 18 to August 24, both dates inclusive, 15 clinical cases occurred. Nine of these were in cows previously detected as carriers. The first cases, however, were not in cows previously detected as carriers. With the exception of the last case of all, where a diptheroid bacillus was isolated, *Str. agalactiæ* was isolated as the causal organism in each case. Table III shows the occurrence of cases.

TABLE III.

Date	No. of cases	Causal organism	Remarks
July 8	1	*Str. agalactiæ*	Not previously detected as carriers.
July 9	1	" "	
July 21	1	" "	
July 23	2	" "	
July 26	2	*Str. agalactiæ*	Previously detected as infected (carriers).
July 30	3	" "	
July 31	2	" "	
August 14	1	*Str. agalactiæ*	Cow previously detected as carrier.
August 17	1	" "	Cow not previously detected as carrier.
August 25	1	Diptheroid bacillus (*Corynebacterium pyogenes*)	Cow not previously detected as carrier.

2A. *Insect Vectors and Summer Mastitis.*

The outbreak on farm B during July and August, 1943, was undoubtedly due to *Str. agalactiæ,* but the reason for the outbreak and its mode of spread were obscure.

As a considerable number of flies were noticed in the park during the time the outbreak occurred, the possibility of an insect vector was considered. Ewing (1942) has stated that flies (*M. domestica Linn.*) can carry *Str. agalactiæ* externally and internally.

XUM

No meteorological records of local weather conditions are available for the months in question, but the dates when infection was presumed to be contracted were compared with the records of a meteorological station 20 miles away.

As pure hypothesis, infection was assumed to have occurred two days (48 hours) before an open, clinical state was observed. In certain instances only, the appearance of clinical cases appeared to have been preceded by periods of damp and warmth. It then proved possible to draw up the following tables (Tables IV and V). This gives the weather records for July and August, 1943, of the before-mentioned station, compared with the dates on which infection was assumed to be contracted on farm B.

TABLE IV.

JULY.

Date	Max.	Min.	Grass Min.	Remarks	Sunshine Before 9 hours	Sunshine Between 9-15 hours	Sunshine After 15 hours	Sunshine Total for day	Wind 9 hours	Rainfall in inches (dcm.)
1	63	47	49		—	—	4.4	4.4	N.1	—
2	57	45	39		—	—	.8	.8	N.1	—
3	65	42	32	Shower	3.7	5.6	—	9.3	NW.2	—
4	68	54	57	14 hours	—	2.4	4.6	7.0	WNW.3	—
5	62	46	37		3.7	1.3	—	5.1	Calm	.05
6	57	44	37	One case mastitis Haze 9 hours	—	.1	—	.1	SE.2	.28
7	64	47	43	One case mastitis	1.2	3.7	.8	5.7	NW.3	.45
8	62	46	43		.6	2.2	1.3	4.1	Calm	.30
9	64	47	43		—	1.1	1.2	2.3	SW.1	.08
10	61	44	39		—	.5	.1	.4	W.1	.02
11	67	52	40		.2	5.9	2.2	8.1	W.4	.14
12	63	48	47		3.2	6.0	3.3	12.5	W.5	.03
13	65	48	42		1.0	4.6	4.8	10.4	WNW.5	.005
14	60	48	47		1.8	.1	—	5.8	SW.2	.08
15	64	54	52		—	.7	5.1	5.8	SW.2	.08
16	68	47	41		3.7	6.0	2.8	12.5	NW.4	Trace
17	67	44	35	Heat haze 9 hours	3.6	6.0	5.2	14.8	Calm	—
18	60	50	46		—	—	—	Nil	ENE.4	—
19	66	47	51	One case mastitis	—	4.0	4.8	8.8	Calm	—
20	62	45	41	Drizzle 2.1 hours	—	1.0	—	1.0	NE.3	.05
21	57	51	41	Drizzle 9 hours, Two cases mastitis	—	—	—	Nil	NE.3	.02
22	63	47	49		—	2.4	4.6	7.0	NE.2	—
23	64	48	48		1.0	6.0	4.3	11.3	Calm	Trace
24	67	42	39	Heat haze 9 hours, Two cases mastitis	3.5	6.0	3.9	13.4	ESE.1	Trace
25	75	47	41	Heat haze 9 hours	2.5	6.0	2.0	10.5	WSW.2	Trace
26	71	54	48		.3	2.1	—	2.4	SSW.2	—
27	71	55	46	Three cases mastitis	.3	6.0	.5	6.8	W.3	.05
28	72	53	52		2.8	4.0	.9	7.7	W.2	—
29	72	52	44	Two cases mastitis	1.6	5.0	1.3	7.9	Calm	—
30	72	49	43		.8	6.0	2.3	9.1	W.2	—
31	77	53	47		3.52	6.0	2.1	11.6	SE.1	.13

The metereological record for August, compared with the dates on which infection appeared is as follows:—

TABLE V.

AUGUST.

Date	Max.	Min.	Grass Min.	Remarks	Sunshine Before 9 hours	Sunshine Between 9-15 hours	Sunshine After 15 hours	Sunshine Total for day	Wind 9 hours	Rainfall in inches (dcm.)
1	73	56	51	Wildfire early morning. Rain early. Thunder and rain 16 hours	.3	3.2	.3	3.8	WNW.1	.11
2	65	54	52		2.1	—	1.1	3.2	W.4	.08
3	65	47	46		2.0	1.5	—	3.5	SW.1	.48
4	59	54	55		—	—	—	Nil	E.3	.18
5	59	54	55		—	—	—	Nil	NE.3	.97
6	59	51	50		1.4	1.6	.6	3.5	NE.3	Trace
7	58	49	44		—	—	—	Nil	W.3	.07
8	61	52	50		.1	—	.9	1.0	W.3	Trace
9	63	50	47		1.0	2.0	1.3	4.3	NW.4	Trace
10	63	50	42		—	.3	1.0	1.3	SE.1	Trace
11	61	47	48	Threatening 9 hours	.1	2.4	1.9	4.4	N.3	.10
12	60	40	34	One case mastitis	3.6	2.4	—	4.0	W.4	.02
13	62	48	45		—	.5	.1	.6	SW.3	Trace
14	61	47	42	Thunder 15 hours	3.7	4.2	.4	8.3	NW.3	.14
15	61	42	42	One case mastitis	3.7	4.3	1.2	9.2	WNW.3	.10
16	61	49	48		—	.1	—	.1	SW.1	.01
17	60	51	51	Drizzle 9 hours	—	—	.1	.1	SE.2	Trace
18	68	54	54		—	.2	—	.2	NW.2	Trace
19	70	55	53		.9	2.3	.4	3.6	SW.2	.03
20	72	56	52		—	2.4	3.0	5.4	S.4	.28
21	65	52	45		—	—	2.0	2.0	SE.2	.08
22	68	48	38		3.2	5.1	2.2	10.5	SW.3	.05
23	65	51	46		1.5	5.2	2.6	9.3	W.3	Trace
24	63	48	43		3.0	1.2	.1	4.3	WNW.3	Trace
25	62	44	34	One case mastitis	—	—	3.3	3.3	W.1	.19
26	63	41	33		2.4	3.4	1.9	7.7	WNW.2	.08
27	65	45	38		1.1	4.4	.4	5.9	NW.2	.05
28	56	47	45		—	—	—	Nil	SW.1	.44
29	63	51	52	Very mild 21 hours	—	.3	—	.3	WSW.1	.33
30	65	53	51		1.0	5.1	3.0	9.1	WNW.4	.02
31	61	48	43		—	.4	.3	.7	Calm	.02

The total hours of sunshine, the total rainfall in inches (dcm.), and the number of open cases of mastitis occurring in July and August respectively was:

Month	Total hours of sunshine	Rainfall in inches (dcm.)	Clinical mastitis
July	... 202.7	1.815	12
August	... 111.5	3.83	3

July, therefore, had almost twice as many hours of sunshine, and half the rainfall of August and four times as many clinical cases of mastitis occurred in July as in August.

By netting, and by simple paper traps containing a little milk from carrier cows, a number of flies were collected from the park for examination, and identified by Dr. A. E. Cameron, Edinburgh. It was then found that definite belts or zones of flies existed in the park. *Musca domestica Linn, Hypoderma sp.*

XUM

and *Stomoxys calcitrans* were not seen to accompany the cows and were found in numbers only on the lower slopes of the park on palings and the trunks. The cows, however, were persistently accompanied by clouds of *Hydrotea irritans*. All the specimens captured were females.

Flies were also trapped on farm D along the riverside permanent grassland grazed by the cows in milk. *Hydrotea irritans* were again found to be the only flies persistently accompanying the cows; they were also taken in the cow houses. All the specimens captured were females. *M. domestica* was not taken.

On farm K trapping again revealed *H. irritans* to be accompanying the cows. On the higher levels they were absent. All the specimens captured were females. *Bibio pomonæ* were as numerous as *Hydrotea* on this farm but did not accompany the cows. *M. domestica* were not taken.

During the summer of 1944 no outbreak of mastitis occurred on any farm. Mastitis was confined to one case of staphylococcal mastitis in a cow on farm H, and to one case in a heifer, due to overstocking, on farm A. There were, relatively speaking, only few flies. The weather, which in general was sunless and dull, possibly accounted for the paucity of dipterous insects and possibly also for the very low incidence of "summer" mastitis.

Part Three

Laboratory Experiments

(1) During the summer of 1944 a series of examinations were carried out to detect whether the incidence of *Str. agalactiæ* was in any way connected with a high butter-fat content of the milk.

For this purpose the cream of milk samples received at King's College for butter-fat estimation was inoculated by a triple loop into thallium acetate broth and incubated for 24 hours and a further 24 hours if necessary. Doubtful samples were taken from the thallium and subcultured in deep crystal-violet blood-agar plates. The samples were received from all over the counties of Durham and Northumberland and the incidence of mastitis in the particular herds was unknown.

One hundred and twenty-four samples were examined, many being repeat samples, i.e., morning and evening samples from the same herd. No correlation was observed between the incidence of *Str. agalactiæ* and any constant butter-fat figure. The experiments were discontinued as it was found that the readings in thallium acetate broth were aberrent, the greatest percentage of errors being found when the butter-fat was high.

(2) A second investigation, consisting of a series of three experiments was carried out to elucidate the following observation. On farms E and H a number of cases of mastitis occurred due to *streptococci of group iv* (Topley and Wilson, 1948), a group that includes the milk-souring streptococcus *Str. lactis* isolated from two clinical cases of mastitis on farm E. There are strains of this organism that can break down the milk protein casein into its component amino-acids. The bacterial parasites of mastitis float in the milk secreted by the host and obtain from it their nutritional requirements, especially as regards nitrogen.

XUM

Davis and Mattick (1936) state that the condition and concentration of protein in foodstuffs is one of the most important factors controlling the flora, and that digestion of protein beyond a certain point results in inhibition of streptococcal growth. The common agent of mastitis *Str. agalactiæ* is, of course, a streptococcus. Wyon and Macleod (1922) have further shown that although amino-acids in appropriate concentration are valuable aids to bacterial growth, the cyclic compounds histidine, tyrosine, tryptophane and phenylalamine and the chain compound cystine are inhibitory in certain low concentrations to a hæmolytic streptococcus (not named) and also to staphylococci. The common agent of mastitis *Str. agalactiæ* is in general a hæmolytic streptococcus, though non-hæmolytic strains do occur.

Of those amino-acids found inhibitory by Wyon and Macleod, histidine, tyrosine, tryptophane and phenylalamine are released by the catalysis of casein. Casein, as remarked, can be broken down by strains of *Str. lactis*.

Farms E and H, where cases of mastitis were found due to *group iv streptococci* and *Str. lactis*, are a bank farm and hill farm respectively.

They are farms where, owing to the poor range of herbage, the protein intake must be persistently low, presumably, therefore, affecting according to Davis and Mattick (1936), the character of the milk microflora.

Both farms are hand milked. Pounden (1941) has found that deferred milking for a period of three days causes a considerable diminution in the number of pathogenic streptococci in an udder affected by mastitis. (Deferred milking did not cure mastitis set up by staphylococci.)

As hypothesis, therefore, it was assumed that as a result of low-protein balance in the feed, and possibly because by hand-milking on the two farms in question the udders were not completely stripped out, a disturbance in the balance of the milk-microflora took place, *Str. agalactiæ* and staphylococci found the micro-environment unfavourable to their nutritional requirements, and at the same time saprophytic streptococci such as *Str. lactis* established themselves, and by breaking up the casein for their nutritional requirements, rendered the milk still more unsuitable to *Str. agalactiæ* and staphylococci.

In order to test this hypothesis a series of three further experiments were carried out to ascertain whether tyrosine and cystine (amino-acids released by the catalysis of casein) in the concentrations given as inhibitory by Wyon and Macleod (0.2 per cent) did inhibit in the test-tube the growth of strains of *Str. agalactiæ* isolated from cases of mastitis encountered during the survey. The experiments and their results are summarised thus:—

Experiment One

On three tubes filled with 10 c.c. milk sterilised by one hour at 60°, ten minutes at 80°, and subsequently inoculated with a pure hæmolytic strain of *Str. agalactiæ*, and ioncubated at 37°.

Control	*Tyrosine* 0.2%	*Cystine* 0.2%
24 hours: Acid, no clot.	Acid, clot.	Acid, clot.
48 hours: Acid, no clot.	Acid, clot.	Acid, clot digestion.
Result: Negative.		

XUM

Experiment Two

On 30 tubes filled with 10 c.c. milk each, sterilised as above, inoculated with *Str. agalactiæ* and incubated at 37°.

Control (10 tubes)	*Tyrosine* 0.2% (10 tubes)	*Cystine* 0.2% (10 tubes)
24 hours: Acid, no visible changes.	4 tubes acid and clot; the remainder acid only.	7 tubes acid and clot; the remainder acid only.

Result: Negative.

Experiment Three

This was carried out on 30 tubes of unsterilised milk; that is, each tube of 10 c.c. contained a microflora. The milk was obtained from samples submitted for the Resazurin test, and control examinations were made to ensure that the samples were free from natural infection by *Str. agalactiæ*. After the milk had been tubed in sterile tubes, each tubeful was inoculated with strains of *Str. agalactiæ* and after incubation for 24 hours at 37° plated out in a solution of 1/100 in crystal violent blood-agar, the plates being incubated for a further 24 hours. The results were as follows:—

Controls	*Tyrosine* 0.2%	*Cystine* 0.2%
No hæmolytic colonies in 10 plates.	Hæmolytic colonies in 7 out of 10 plates.	Hæmolytic colonies in 1 out of 10 plates.

Results: Negative.

From these experiments it would appear that the concentrations of tyrosine and cystine given as inhibitory by Wyon and Macleod (1932) did not inhibit growth of *Str. agalactiæ* in laboratory culture. It will be seen from the analysis of casein given below (from Foreman, 1919) that these amino-acids are present in much greater concentration than that used in the experiments. It would have been desirable, therefore, to ascertain whether higher concentrations inhibited *Str. agalactiæ*, but, unfortunately, considerable difficulty had been encountered in obtaining a sufficient amount, and as the quantity available was exhausted no further experiments were possible.

The composition of casein (Foreman, 1919):—

Glycine, 0.45 per cent; Alanine, 1.85 per cent; valine, 7.93 per cent; leucine, 9.7 per cent; proline, 7.6 per cent; phenylalamine, 3.88 per cent; glutamic acid, 21.77 per cent; aspartic acid, 1.77 per cent; new syrups, 14.34 per cent; lysine, 7.62 per cent; histidine, 2.5 per cent, arginine, 3.81 per cent; tryptophine, 1.5 per cent; cystine, 0.5 per cent; tyrosine, 4.5 per cent; hydroxy-proline, 0.23 per cent; diamino-trihydroxy-dodecanic acid, 0.75 per cent.

Part Four

Conclusion and Discussion.

The findings of the survey considered as a study in ecology.

In this country, mastitis of dairy cows is most generally caused by *Streptococcus agalactiæ* (Malcolm, 1940).

The present survey of 11 Northumberland dairy farms did not reveal a high incidence of mastitis due to this organism. It was detected on five farms only out of the 11 surveyed, and of the five infected farms one farm had only one case.

The percentage infection by *Str. agalactiæ* was, however, higher, as previously shown, than that of any other organisms—28 cases out of 253 cows, or 11.06 per cent.

The incidence of infection by *Str. agalactiæ* was considered in relation to the situation of the farm and the daily average yield, as shown in Table VI:—

TABLE VI.

	Farm.	Situation.	No. of cows.	Annual average daily milk output in gallons.	*Str. agalactiæ.*
VALLEY	B	Valley of West Allen.	37	70.0	10 cows.
	A	Valley of West Allen.	26	50.0	9 cows.
	J	Watershed, West Allen.	29	45.0	4 cows.
	D	Valley of East Allen.	23	40.0	1 cow.
	C	Bank above West Allen.	26	41.5	0 cows.
	E	Bank above East Allen.	34	35.0	0 cows.
	F	Bank above West Allen (600 ft.—200 m.—contour).	18	30.0	0 cows.
	G	Bank above West Allen (700-800 ft.—266 m.—contour).	18	17.0	0 cows.
HILL	K	Hill farm (1,000 ft.—330 m.—contour).	31	45.0	4 cows.
	H	Hill farm.	22	20.0	0 cows.
	I	Hill farm (over 1,000 ft.—400 m.—contour).	18	19.0	0 cows.

Table VI shows that latent infection by *Str. agalactiæ* is present on those farms which attain the highest average daily milk yield.

Farms A and J attain 60-70 gallons in summer. Farm B maintains an average of 70 gallons *per diem* all the year round, while farm K is a hill farm maintaining a constant of 40 gallons *per diem,* which is high compared with the other hill farms surveyed.

An exception is provided by farm D, whose milk yield attains in summer to a peak of 50 gallons daily, less than that attained on farm C, whose summer figure is 58 gallons daily. One case only of *Str. agalactiæ* infection, however, was detected on farm D, whose dominant infection was staphylococcal.

On six of the 11 farms surveyed no trace of *Str. agalactiæ* infection was detected. These are the bank or hill-side farms C, E, F, G, and the hill farms H and I. They are all farms which exist under conditions imposed by their natural environment, for modern methods of agriculture have not been adopted to a degree which materially affects the environment. The soil is of acid reaction and the pasture available to the dairy cows is of poor quality. It has the

characteristics of the well-known cocksfoot pastures of Northumberland. This old-type grazing, with some sheep fescues and bents, is all that is available for the maintenance and milk production of the cows. The carotene and vitamin content of cocksfoot is low, that of the sheep fescues but little higher (Moon, 1938), and low vitamin A intake restricts milk production (Godden, 1942).

Hay prepared from these pastures loses much of its vitamin content during drying, and can only provide a maintenance ration during the winter. The milk yield therefore sinks. On the hill farms, bent is especially prevalent. Peel (1938) observes that milking cows are unsuitable for grazing bent pastures as they cannot keep it bare without losing condition and milk yield. When the cows are turned out in the spring or early summer the fresh grazing available causes a rise in the average total daily yield. On these six farms the cows may be said to exist under conditions approaching the natural or wild state. *Str. agalactiæ* infection is not a problem among them, and mastitis typically occurs from invasion by saprophytic or other extraneous organisms when the lactating tissues are depressed by injury or natural factors, such as wet and cold.

Of the five farms A, B, D, J, and K, where infection by *Str. agalactiæ* was detected, farms A, B, and D are valley farms whose position is sheltered from extremes of weather. Numerous trees break the winds and by their expiration of water vapour provide a more humid climate. Some degree of ploughing up has been practised, particularly on farm B, and a wide range of grasses gives a more nutritious ration. Farm B makes ensilage as a supplement to the ration. Farm J lies on the banks of the West Allen and is sheltered to the south by trees and thickets along the course of the river. Its grazing is more nutritious, i.e., contains a more numerous variety of grasses, than on the other bank-side farms, though it has not the quality of that on farms A, B, and D. Farm K is a hill farm where the pasture has been graded up by ploughing up the old permanent cocksfoot-type pastures, re-seeding, and putting down temporary leys.

A second point shown by Table VI is that infection by *Str. agalactiæ* is found on those farms having the larger herds. The farms with the largest herds were all affected by *Str. agalactiæ,* with the exception of farms E and C.

Watts (1942) provides evidence that *Str. agalactiæ* infection is associated with the use of milking machines. Farms A, B, D, and K, where infection by *Str. agalactiæ* was detected, all use milking machines. Farm J, where four cows were found infected by *Str. agalactiæ,* is hand milked. No infection by *Str. agalactiæ* was found on farm F, which is machine milked.

Table VI therefore provides evidence that cases of mastitis due to *Str. agalactiæ* tended to occur more frequently on farms having the following features:—

1. A high average daily yield.
2. A large herd.
3. A milking machine.

Summer mastitis: During a severe outbreak of mastitis on farm B during the summer of 1943, dipterous insects, *Hydrotea irritans*, all females, were found

infesting the cows. A small number of cases of mastitis also occurred on farms D and K, where *H. irritans,* all females, were again found infesting the cows. Cows heavy in milk often ooze milk at the tips of the teats, and in investigating the role of *M. domestica* in mastitis, Ewing (1942) found both *Str. agalactiæ* and staphylococci present on the external surfaces of the teat sphincter on all the mastitis animals examined. The hydrotea are by preference vegetarians, living on fruit sap, but the females on occasion attack animals, sucking up secretions on the skin surface by means of a soft proboscis (Newmann, 1905). The agents responsible for the mastitis on farm B were those peculiar to the herd, e.g., *Str. agalactiæ*; on farms D and K, staphylococci; and it was considered probable that the hydrotea might have spread the infection by sucking up milk infected by the organisms of mastitis and conveying it to cows not hitherto infected.

It was reported that in previous years summer mastitis had caused much loss among the hill farms, and that the outbreaks were always generally associated with the appearance of swarms of flies.

An insufficient number of cases occurred during the present survey for any conclusions to be drawn as to the truth of this report.

Nevertheless, the heavy loss incurred on farm B arose when the cows were moved into an ornamental park, the turf of which consisted of old, permanent grass, resembling the old, permanent pastures of the hill farms. Old, permanent grassland, the mat of which harbours the larvæ of dipterous insects, may therefore be a potential source of danger by providing, under suitable weather conditions, mechanical insect vectors.

The findings during the outbreak of summer mastitis did not invalidate those of the survey, as the organisms responsible were confined, with one exception on Farm B, to those previously detected as latent sources of the disease on the farms in question.

Considering all the facts obtained during the survey, therefore, it was considered that from the broad aspect *Str. agalactiæ* was responsible for the largest number of cases of mastitis, and that its incidence was most prevalent on farms whose dairy cows were artificially fed and housed. On five farms where mastitis due to this organism was detected the cows grazed under sheltered conditions, were adequately fed and housed, they were congregated in large herds, and they were milked by machines. The details of their ecology were artificial and imposed by unnatural agencies. Six farms free from *Str. agalactiæ* infection existed in an environment that approached the natural or wild state. The cows were milked very largely by hand, they lived exposed to the elements, and their grazing was poor and at certain seasons approached the starvation line. Nevertheless, mastitis in general was not so serious a problem among them, and *Str. agalactiæ* was absent, though in the other group milked by machines the incidence averaged 30 per cent. The particular factors of civilisation predisposing to infection by *Str. agalactiæ* were considered to be the high average daily yield; the large herds, confined in sheltered houses, with resultant risk of transmission

XUM

of infection; and the use of milking machines. These factors may be analysed statistically as follows:—

TABLE VII.

Factors involved in average daily milk output of farms.		Cases of infection with *Str. agalactiæ*. Present.	Absent.	Probability (P) *
1. Average daily yield per annum on "per cow" basis.	1.40-1.92 gallons.	5 farms.	2 farms.	About 0.1
	0.91-1.39 gallons.	0 farms.	4 farms.	
2. Number of cows per farm.	27.6-37.0 gallons.	3 farms.	1 farm.	0.1
	18.0-27.5 gallons.	2 farms.	5 farms.	
3. Type of milking.	Machine.	4 farms.	1 farm.	0.1
	Hand.	1 farm.	5 farms.	

*Using Yate's correction for x^2.

The results obtained are not statistically significant (P, last column, Table VII), but this is probably due to the smallness of the sample (11 farms). A survey of a larger number of farms might show a significant correlation between mastitis caused by *Str. agalactiæ* and the three selected factors of civilisation.

The present survey of 11 Northumberland dairy farms supported the conclusion reached by the National Veterinary Medical Association (1940), namely, that *Str. agalactiæ* is responsible for the highest number of cases of mastitis. It also indicated that infection by this organism is a disease most prevalent among cows living in numbers under artificial conditions, that is, that it is a disease of civilisation.

Summary

A survey for the incidence of the organisms of mastitis was carried out during 1943 and 1944 on a group of eleven Northumberland farms lying in or above the confluence of the rivers East and West Allen.

In this country, 80-90 per cent of all cases of mastitis are due to *Str. agalactiæ*.

The survey revealed that only five of the 11 farms were affected by *Str. agalactiæ*, but the number of cows affected was higher than that affected by other organisms. *Str. agalactiæ* infection, also, was common only in those farms with the highest average total output of milk for their particular group, hill or valley farms.

Str. agalactiæ infection was not present on all farms using milking machines. It was present on four farms, and absent from one farm, using milking machines.

Outbreaks of mastitis on three farms in the summer were confined to organisms already detected as causes of mastitis on the farms concerned. The dipterous insect *Hydrotea irritans* was found present accompanying the cows on all three farms. Evidence is brought forward suggesting that the insects acted as mechanical vectors.

Some inconclusive experiments are reported on association between *Str. agalactiæ* infection and the butter-fat content of milk, and the action of amino-acids upon *Str. agalactiæ*. Details of the geological formation of the valleys, the soil features and the grasses are given, supporting the contention that the study of mastitis on the 11 farms surveyed is one of ecology. The cows exist under

conditions imposed by their environment. Where this approaches the normal, or wild state, infection by *Str. agalactiæ* is absent, but the more the normal is departed from the higher becomes the incidence of *Str. agalactiæ* infection.

Mastitis due to *Str. agalactiæ*, the most common form of mastitis in this country, is therefore concluded to be a disease of artificial environment, i.e., civilisation.

REFERENCES

Davis, R. E., and Mattick, A. T. R. (1936): *Jl. Dairy Res., 4,* 8.
Ewing, H. E., Junr. (1942): *Amer. Jl. Vet. Res., 3* (No. 8), 295.
Foreman, E. (1913): "A System of Dairy Chemistry."
Godden, W. (1942): *Jl. Roy. Agric. Soc., 103,* 39.
Malcolm, J. F. (1940): *Scottish Farmer,* January 27.
Moon, F. E. (1938): *Jl. Soc. Chem. Indust.,* 57, 455; 57, 457.
National Veterinary Medical Association (1940): Report on Diseases of Farm Livestock.
Neumann, L. G. (1905): Treatise on Parasites.
Peel, W. R. (1938): "Grassland Management for the Practical Farmer."
Pounden, W. D. (1941): *Cornell Vet., 31,* 339.
Watts, P. S. (1942): *Vet. Rec., 54* (No. 19), 181.
Wyon, G. A., and Macleod, J. W.: *Jl. Hyg., 4,* 376.

REVIEWS

THE BOOK OF THE POODLE, by T. H. Tracy. Medium quarto, 122 pp., profusely illustrated. London: The Harvill Press, Ltd. Price 30s.

IT was bound to come, and here it is, a book about the Poodle, and as elegant and beautiful as the dog.

This haughty, this dainty, this courageous, self-possessed dog, this aristocrat who seems to exude blue blood, has gained his place of honour in the canine world. It has not been easy. He has run the gamut of ridicule, contempt and envy with such unperturbed poise and disdain that he has become the cynosure of all eyes, even those of his erstwhile detractors. But what a shock to find that this beau of the boulevard, this intimate companion of the gay ladies, is not a true Parisian, but a product of prosaic Western Russia and Northern Germany, and that he was called "Pudel," for he splashed in water and mud to retrieve game. Who would have thought that he ever had to work for his living?

It was the French who turned him into the apparent "fop." They clipped him, they shaved him, and they set the fashion for the Poodle tonsorial art. It is good to know that this was not entirely for show, or in response to some passing whim, but that there was a utilitarian purpose behind the fancy stuff. A trimmed dog could swim better and with less fatigue, and his bracelets and hip pom-poms were a guard against rheumatism.

Poodles have great heads and an intelligence above most other breeds. They can think, they can dance, they can perform, they can be taught to count, and it is whispered that some have attained the gift of speech.

This book tells us much about Poodles, be they the standard, miniature, or toy. It gives their origin and describes how Wellington's men brought them to England. There is word of the performing dog, and an account of his prowess

with the gun. We are told how to choose a puppy, how to care for him and clip him. There are notes on breeding and handling, and simple home doctoring. Mr. Tracy has enlisted the aid of noted authorities, who have said their piece and covered almost every angle. There is a useful appendix for the potential exporter, for in it there is set forth the regulations which govern the importation of dogs into many countries.

Many who are privileged to read this book will want to possess a Poodle. If they do so they will join the company of distinguished men, for "Rufus," a Poodle, belongs to Mr. Winston Churchill.

THE FARMER AND STOCK-BREEDER YEAR BOOK, 1952. 8¾ in. x 5½ in., 412 pp., 170 illustrations. London. Price 10s. 6d.

THIS hardy annual has again made its welcome bow. It is, of course, chiefly of interest to the agriculturist, but it is also a useful reference book to the veterinary surgeon. The photographic section of 64 pages is very well printed and includes many of the outstanding animals of the year. There are over 30 pages of addresses of institutions and organisations in the agricultural field—a most useful feature.

NEWS

THE BRITISH VETERINARY ASSOCIATION

WITH effect from January 1, 1952, the National Veterinary Medical Association assumed the title of British Veterinary Association, a change which, no doubt, will be welcomed as being less cumbersome than the old one. The "National," as it was always called, was founded in 1883, and is in all respects the veterinary counterpart of the British Medical Association.

CRUFT'S DOG SHOW

CRUFT'S Dog Show is being held at Olympia on February 8 and 9, 1952. The popularity of the show has grown to such an extent that it will now extend over the whole area of the Grand and National Halls of Olympia.

An innovation will be obedience tests performed by the best trained dogs in the country. All the dogs competing will be those which have won obedience tests during the year.

Publisher's Notices

THE BRITISH VETERINARY JOURNAL, with which is incorporated THE VETERINARY JOURNAL, is published monthly, and copy for advertisements should be in the hands of the advertisement manager not later than the 20th of the preceding month, if proof is required. Tel.: Temple Bar 3386.

Letters for the Journal, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Annual Subscription, 40s. ($6.50 U.S.A. currency, post free.)

King George VI.

On February 6, 1952, the British Commonwealth suffered a sudden and grievous loss in the death of our beloved sovereign, King George VI. Like his father, King George V, he had earned a place in our hearts which far transcended his kingly rank. He was noble, yet humble; he was good, he was wise; and instinctively we acknowledged him as the father of our great family.

He carried his high rank and honour with the utmost graciousness, and yet he never lost the common touch. He went freely amongst his subjects and they talked to him as a friend, for he was interested in their work and their play. His people recognised him as one to whom they could turn for inspiration in times of grief or anxiety. In his private life he set an example to all for he epitomised all that was best in the family and home. We remember with gratitude the occasions on which he spoke to us, and especially his Christmas radio talks when he was welcomed into the intimacy of our family circle. His well-chosen words brought hope and comfort to a troubled world.

Veterinary surgeons had other reasons for holding the late King in high regard. He was a horseman, a farmer, and a sportsman. He did much to help and encourage the advance of Veterinary Science and gave his patronage to objects and institutions which had this end in view. He was Patron of the Royal College of Veterinary Surgeons and of the Royal Veterinary College. He took a deep interest in the Camden Town school and gave Sir Frederick Hobday considerable help in the great task of rebuilding it; he and his Queen performed the opening ceremony in 1937.

A great king has passed on to join his fathers, but he leaves behind in our minds an imperishable memory of a man with a high mission who shirked no sacrifice in the cause of duty and who set an example to the world. We tender our respectful duty and sympathy to the Royal Family and venture to express the hope that the great love that his late Majesty engendered in all of us may in some small measure comfort them in their grief.

XUM